

REMARKS

Applicants have studied the Office Action dated June 15, 2005. No new matter has been added. It is submitted that the application, is in condition for allowance. Applicants have amended independent claims 1, 11, and 14 and claims 3, 4, 8, 11, 13, 14, 16 and 21. By virtue of this amendment, Claims 1, 3-11, 13-14, and 16-22 are pending. Reconsideration and further examination of the pending claims in view of the above amendments and the following remarks is respectfully requested. In the Office Action, the Examiner:

- Rejected claims 1, 3-10, 14, and 16-22 under 35 U.S.C. 103(a) as being unpatentable over Takiguchi et al. (U.S. Patent No. 6,549,681), and further in view of Parulski et al. (U.S. Patent No. 6,812,961); and
- Rejected claims 11 and 13 under 35 U.S.C. 103(a) as being unpatentable over Takiguchi et al. (U.S. Patent No. 6,549,681), and further in view of Parulski et al. (U.S. Patent No. 6,812,961), in further view of Examiner's Official Notice.

Overview of the Present Invention

The present invention provides a picture stitching device, a method, and a computer readable medium for creating a panoramic image from at least two images. A digital camera is one type of picture stitching device that has become very popular for creating panoramic images. To provide panoramic photography effects, digital cameras can interface with personal computers for joining together two or more images into one image to provide a panoramic effect by joining edge boundaries of images. One problem often encountered when using digital cameras for creating panoramic pictures is the amount of additional memory needed to save the panoramic image separately from the original images composing the panorama image.

Another problem encountered is how the panoramic image is stored. Specifically, the

prior art systems store the panoramic image in strips or in a format other than the complete panoramic image. A panoramic image format that is stored in strips or in a format other than the complete image is useful only for a stitching application. Other applications, such as, an electronic photo album, process each strip as a single image and displays each image separately. This displaying of each strip separately many times confuses the user since the entire panoramic image is not displayed at once. Accordingly, a need exists for a method and a system to store still images in an image format that is compatible with other image formats such as JPEG.

An additional problem is that pictures saved with original parameters such as motion estimation, color correction, focal length and other image stitching parameters are not compatible with popular storage formats such as JPEG (Joint Photographic Experts Group ISO standard 10918). In fact, along with the Graphic Interchange Format (GIF) file, the JPEG is a file type supported by the World Wide Web protocol. Accordingly, a need exists for a method and apparatus to store images with panoramic parameters in such a way that the image storage format is compatible with other still image formats such as JPEG. In addition to the above problems, a user is left with very little choice for correcting imperfections in the panoramic image after it is captured if the parameters of motion estimation and color correction are lost

To overcome the problems of using a digital camera to create a panoramic image, the present invention receives a first image forming a part of a series of images to form a panoramic image. The first image is then stored in memory. One or more subsequent images are received and for each of the images received one or more panoramic parameters are calculated between a current image and a previous image stored in memory. Also, the current image is stored with the one or more panoramic parameters in memory. The one or more panoramic parameters are also stored in a field of a compressed image format reserved for at least one of comments and extensions so as to preserve the stored image file compatibility with other images stored without the one

or more panoramic parameters.

In order to more particularly point the distinctness of the present invention the following language has been added to the independent claims, i.e., claims 1, 11, and 14 as follows:

receiving a first image forming a part of a series of images to form a panoramic image;

storing the first image in memory;

receiving one or more subsequent images and for each of the images received performing the sub-steps of

calculating one or more panoramic parameters including motion estimation and color correction between a current image and a previous image stored in memory; and

storing the current image with the one or more panoramic parameters in memory, wherein the one or more panoramic parameters are also stored in a field of a compressed image format reserved for at least one of comments and extensions so as to preserve the stored image file compatibility with other images stored without the one or more panoramic parameters.

No new matter has been added. Support for this amended language is found in the application as originally filed and particularly at FIGs. 10 and 13-14 and pages 13, 16, and 20.

Rejection under 35 U.S.C. §103(a) as being unpatentable over Takiguchi and Parulski
As noted above, the Examiner rejected claims 1, 3-10, 14, and 16-22 under 35 U.S.C. 103(a) as being unpatentable over Takiguchi et al. (U.S. Patent No. 6,549,681), and

further in view of Parulski et al. (U.S. Patent No. 6,812,961). Independent claims 1, 11 and 14 have been amended to distinguish over Takiguchi taken alone and/or in view of Parulski. The Examiner on Page 3 of the Office Action correctly states that Takiguchi teaches a method for storing a plurality of still images in which data is stored in JPEG data format. Takiguchi is silent on teaching storing panoramic data image including motion estimation and color correction for later stitching (or synthesizing) into a panoramic image. Takiguchi does not keep the motion estimation and color correction stored with images. Takiguchi may estimate these parameters after capturing using the "image synthesization unit 517" but they are not maintained and certainly not stored with the image. See Takiguchi at col. 19, line 15 to col. 22, lines 53. Accordingly, the present invention distinguishes over Takiguchi for at least this reason.

The Examiner on Page 3 of the Office Action correctly states that Takiguchi is "*silent as to storing additional data in a field reserved for at least one of comments and extensions*" and goes on to combine Takiguchi with Parulski¹. The Examiner recites 35 U.S.C. §103. The Statute expressly requires that obviousness or non-obviousness be determined for the claimed subject matter "as a whole," and the key to proper determination of the differences between the prior art and the present invention is giving full recognition to the invention "as a whole." The Examiner cites Parulski at col. 4, lines 35-43, which is reproduced for convenience below with Emphasis Added.

The processor 320 performs color interpolation followed by color and tone correction, in order to produce rendered sRGB image data. The rendered sRGB image data is then JPEG compressed and stored as a JPEG image file on the removable memory card 16. The JPEG file uses the so-called "Exif" image format defined in "Digital Still Camera Image File Format (Exif)" version 2.1, July 1998 by the Japan Electronics Industries Development Association (JEIDA), Tokyo, Japan. This format includes an Exif application segment that stores particular image metadata, for

¹ Applicants make no statement whether such combination is even proper

example the date and time the picture was captured, the lens f/number and other camera settings, and image captions or comments that can be selected or entered by the camera user.

Parulski is completely silent on panoramic stitching and synthesization. Parulski is directed to method and system for capturing images to a service provider. See Parulski Abstract and Summary. Parulski is silent on teaching storing panoramic data image including motion estimation and color correction for later stitching (or synthesizing) into a panoramic image. Accordingly, independent claims 1, 11 and 14 distinguish over Takiguchi taken alone and/or in view of Parulski for at least reason.

Moreover, the Federal Circuit has consistently held that when a §103 rejection is based upon a modification of a reference that destroys the intent, purpose or function of the invention disclosed in the reference, such a proposed modification is not proper and the prima facie case of obviousness can not be properly made. See *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). Here the intent, purpose and function of Takiguchi is downloading images captured on a camera to a computer and running software application with an image synthesization unit 517. Takiguchi does not mention storing the panoramic image data including motion estimation and color correction with the images themselves. Therefore, the system in as described in Takiguchi taken alone and/or in view of Parulski must re-calculate the panoramic image information every time the images are to be synthesized. In contrast, the intent and purpose of the present invention is calculating and storing with each image the panoramic parameters including motion estimation and color correction with the image itself. Not only does the present invention eliminate the need to recalculate parameters required for panoramic image synthesization with the image, thereby reducing processing requirements, the present invention maintains well known file formats. By storing the motion estimation and color correction parameters in a field of a compressed image format reserved for at least one of comments and extensions so as to preserve the stored image file compatibility with other images stored without the one or more panoramic parameters. This maintains compatibility with both non-panoramic and panoramic images. This combination, as

suggested by the Examiner, destroys the intent and purpose of Takiguchi taken alone and/or in view of Parulski's use of calculating the motion estimation and color correction parameters every time the images are stitched or synthesized. Accordingly, the present invention is distinguishable over Takiguchi taken alone and/or in view of Parulski for this reason as well.

Continuing further, when there is no suggestion or teaching in the prior art for storing motion estimation and color correction with the image itself the suggestion can not come from the Applicant's own specification. The Federal Circuit has repeatedly warned against using the Applicant's disclosure as a blueprint to reconstruct the claimed invention out of isolated teachings of the prior art. See MPEP §2143 and Grain Processing Corp. v. American Maize-Products, 840 F.2d 902, 907, 5 USPQ2d 1788 1792 (Fed. Cir. 1988) and In re Fitch, 972 F.2d 160, 12 USPQ2d 1780, 1783-84 (Fed. Cir. 1992). The prior art reference Takiguchi taken alone and/or in view of Parulski does not even suggest, teach nor mention motion estimation and color correction stored with the image. The problems each of the cited references Takiguchi taken alone and/or in view of Parulski are trying to solve are different than the problem solved by the current invention.

For the foregoing reasons, independent Claims 1, 11, and 14 as amended distinguish over Takiguchi taken alone and/or in view of Parulski. Claims 3-10, 13, and 16-21 depend from amended Claims 1, 11 and 14 respectively, and since dependent claims contain all the limitations of the independent claims, Claims 3-10, 13, and 16-21 distinguish over Takiguchi taken alone and/or in view of Parulski, and the Examiner's rejection should be withdrawn, which withdrawal is respectfully requested.

With regards to the group of claim 3, 13, 16 and 6 and 19, the Examiner again points to Parulski at col. 4, lines 35-43 for the teaching of Exif. Exif is defined as
“(EXchangeable Image Format) Extensions to image file formats that hold
the camera settings used to take the picture. Developed in 1995 by JEIDA

for JPEG images, EXIF data was added to TIFF, RAW and other formats later. Most digital cameras support EXIF and save the data in the file headers. However, when an image is edited, the EXIF data may be automatically removed by the software. An EXIF reader is a utility that is used to read, display and save EXIF data from a file."

From online URL (http://www.pcmag.com/encyclopedia_term with Emphasis Added). Accordingly, the Exif extension is an addition to the underlying compress image format standards JPEG and TIFF commonly used in cameras. This difference is clearly explained at online URL (<http://en.wikipedia.org/wiki/Jpeg>) with Emphasis Added:

In computing, JPEG (pronounced jay-peg) is a commonly used standard method of lossy compression for photographic images. The file format which employs this compression is commonly also called JPEG; the most common file extensions for this format are .jpeg, .jff, .jpg, .JPG, or .JPE although .jpg is the most common on all platforms.

The name stands for Joint Photographic Experts Group. JPEG itself specifies only how an image is transformed into a stream of bytes, but not how those bytes are encapsulated in any particular storage medium. A further standard, created by the Independent JPEG Group, called JFIF (JPEG File Interchange Format) specifies how to produce a file suitable for computer storage and transmission (such as over the Internet) from a JPEG stream. In common usage, when one speaks of a "JPEG file" one generally means a JFIF file, or sometimes an Exit JPEG file. There are, however, other JPEG-based file formats, such as JNG.

JPEG/JFIF is the most common format used for storing and transmitting photographs on the World Wide Web. It is not as well suited for line drawings and other textual or iconic graphics because its compression method performs badly on these types of images (the PNG and GIF formats are in common use for that purpose; GIF, having only 8 bits per

pixel is not well suited for colour photographs, PNG can be used to losslessly store photographs but the filesize makes it largely unsuitable for putting photographs on the web).

This distinction is important, because the present invention teaches compression format of JPEG/JFIF which is covered by the ISO DIS 10918 specification. See the present invention at page 15 of the specification as originally filed. Therefore a JPEG file format (also known as JPEG/JIFF file format) is not interchangeable and is not the same as the Exit JPEG file format.²

Claims 3, 13, 16 and 6 and 19 have been amended to clarify the JPEG file format "as defined by the ISO DIS 10918" i.e. the JPEG/JIFF file format. Support for this amendment is found in the present invention as originally filed on pages 4 and 15. No new matter has been added.

For the foregoing reasons, claims 3, 13, 16 and 6 and 19 as amended distinguish over Takiguchi taken alone and/or in view of Parulski, and the Examiner's rejection should be withdrawn, which withdrawal is respectfully requested.

Rejection under 35 U.S.C. §103(a) as being unpatentable
over Takiguchi, Parulski & Official Notice

As noted above, the Examiner rejected claims 11 and 13 under 35 U.S.C. 103(a) as being unpatentable over Takiguchi et al. (U.S. Patent No. 6,549,681), and further in view of Parulski et al. (U.S. Patent No. 6,812,961), in further view of Examiner's Official Notice.. Independent claims 1, 11 and 14 have been amended to distinguish over

² *"JG based software writes a JFIF APP0 marker between SOI and Exif APP1 marker. According to the Exif specification, the Exif APP1 marker has to follow immediately after the SOI, just as the JFIF specification requires the same for the JFIF APP0 marker! Therefore a JPEG file cannot legally be both Exif and JFIF at the same time!"*

Takiguchi taken alone and/or in view of Parulski. The Examiner on Page 6 of the Office Action states that *"Official Notice is taken that a program of instruction, executable by a machine and programmable directly into a machine, are easily transferred to a computer readable storage medium; a concept is well know that is executed in the art."* However, for the reasons stated above in the section entitled "Rejection under 35 U.S.C. §103(a) as being unpatentable over Takiguchi and Parulski" does not even suggest, teach nor mention motion estimation and color correction stored with the image. The Official Notice taken by the Examiner does not suggest or teach this patentably distinct limitation either. Accordingly, independent Claim 11 as amended distinguish over Takiguchi taken alone and/or in view of Parulski and in view of Official Notice. Claim 13 depends from amended claim 11, and since dependent claims contain all the limitations of the independent claims, claims 13 distinguishes over Takiguchi taken alone and/or in view of Parulski, and/or in view of Official Notice, and the Examiner's rejection should be withdrawn, which withdrawal is respectfully requested.

CONCLUSIONS

In light of the Office Action, Applicants believe these amendments serve a useful clarification purpose, and are desirable for clarification purposes, independent of patentability. Accordingly, Applicants respectfully submit that the claim amendments do not limit the range of any permissible equivalents.

Applicants acknowledge the continuing duty of candor and good faith to the disclosure of information known to be material to the examination of this application. In accordance with 37 CFR §§ 1.56, all such information is dutifully made of record. The foreseeable equivalents of any territory surrendered by amendment is limited to the territory taught by the information of record. No other territory afforded by the doctrine of equivalents is knowingly surrendered and everything else is unforeseeable at the time of this

(Emphasis added from online URL <http://sylvana.net/jpegcrop/exifpatch.html>)

amendment by the Applicants and their attorneys.

Applicants respectfully submit that all of the grounds for rejection stated in the Examiner's Office Action have been overcome, and that all claims in the application are allowable. No new matter has been added. It is believed that the application is now in condition for allowance, which allowance is respectfully requested.

PLEASE, if for any reason the Examiner finds the application other than in condition for allowance, the Examiner is invited to call either of the undersigned attorneys at (561) 989-9811 should the Examiner believe a telephone interview would advance the prosecution of the application.

Respectfully submitted,

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